Semester:5th	Department of Electronics and Communication Engineering	AY: 2026-27
Course Code: BEC515A	Course Name: Intelligent Systems and Machine Learning	

Question Bank

Q.	Module-01	M	L	C
1.	Define Artificial Intelligence (AI) and explain its major objectives and applications.	10	L2	CO1
2.	Explain the foundations of AI and describe the contributions of different disciplines to its development.	10	L2	CO1
3.	Describe the historical development of AI and explain its major milestones.	10	L2	CO1
4.	Define an intelligent agent and explain the interaction between an agent and its environment with a suitable example.	10	L2	CO1
5.	Explain the concept of rationality in intelligent agents and describe the factors that determine rational behavior.	10	L2	CO1
6.	Classify task environments according to their properties and explain each classification with suitable examples.	10	L2	CO1
7.	Explain the structure of an intelligent agent and describe the roles of its major components.	10	L2	CO1
8.	Differentiate between an agent, an agent function, and an agent program with suitable examples.	10	L2	CO1
9.	Apply the concept of rational agents to design an agent for a simple vacuum-cleaner environment. State its percepts, actions, and performance measure.	10	L3	CO1
10.	Construct a suitable agent architecture for an autonomous navigation system and explain how it interacts with its environment.	10	L3	CO1
	Module-02			
11.	Explain the role of problem-solving agents in Artificial Intelligence and describe the steps involved in problem formulation.	10	L2	CO2
12.	Describe the components of a well-defined search problem with a suitable example.	10	L2	CO2
13.	Explain how a problem-solving agent searches for a solution and describe the process of selecting and executing actions.	10	L2	CO2
14.	Explain Breadth-First Search (BFS) and demonstrate its operation using a suitable search tree.	10	L3	CO2
15.	Explain Depth-First Search (DFS) and demonstrate its operation on a given search tree.	10	L3	CO2
16.	Compare BFS and DFS in terms of completeness, optimality, time complexity, and space complexity.	10	L4	CO2
17.	Explain Iterative Deepening Depth-First Search (IDDFS) and demonstrate how it explores a search tree using increasing depth limits.	10	L3	CO2
18.	Compare BFS, DFS, and IDDFS with respect to memory requirements, solution quality, and search efficiency.	10	L4	CO2

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19.	Apply BFS to find a path from a specified initial state to a goal state in a given graph. Show the order in which nodes are visited.	10	L3	CO2
20.	Apply DFS and IDDFS to a given search tree and compare the order of node expansion and the solutions obtained.	10	L3	CO2
	Module-03			
21.	Explain heuristic functions and describe their importance in informed search strategies with suitable examples.	10	L2	CO3
22.	Explain Greedy Best-First Search and demonstrate its working using a suitable search tree and heuristic values.	10	L3	CO3
23.	Explain the A* search algorithm and demonstrate how the evaluation function (f(n)=g(n)+h(n)) is used to select nodes.	10	L3	CO3
24.	Compare Greedy Best-First Search and A* Search in terms of evaluation functions, optimality, and search behavior.	10	L2	CO3
25.	Explain the architecture of a knowledge-based agent and describe the roles of the knowledge base and inference mechanism.	10	L4	CO3
26.	Describe the Wumpus World environment and explain how an intelligent agent uses percepts and knowledge to make decisions.	10	L2	CO3
27.	Explain propositional logic and describe the use of logical connectives in representing knowledge.	10	L3	CO3
28.	Translate given English statements into propositional logic using appropriate logical connectives.	10	L3	CO3
29.	Explain the major reasoning patterns in propositional logic, including modus ponens and modus tollens, with suitable examples.	10	L2	CO3
30.	Apply propositional logic inference rules to derive a valid conclusion from a given set of premises.	10	L3	CO3
	Module-04			
31.	Define Machine Learning and explain its importance, major applications, and role in intelligent systems.	10	L2	CO4
32.	Explain the different types of machine learning and describe their characteristics with suitable examples.	10	L2	CO4
33.	Explain the major challenges of machine learning and describe their effects on model performance.	10	L3	CO4
34.	Describe the steps involved in designing a machine learning system, from identifying the problem to evaluating the learned model.	10	L2	CO4
35.	Explain concept learning and describe how a learning algorithm derives a general concept from training examples.	10	L3	CO4
36.	Explain the concept of version spaces and demonstrate how the specific and general boundaries represent consistent hypotheses.	10	L3	CO4
37.	Apply the Candidate Elimination algorithm to a given training dataset and demonstrate how the version space is updated after each example.	10	L3	CO4
38.	Explain inductive bias and describe its importance in selecting and generalizing hypotheses in machine learning.	10	L2	CO4
39.	Analyze the relationship between training examples, hypothesis spaces, and version spaces in concept learning.	10	L4	CO4

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40.	Compare supervised, unsupervised, and reinforcement learning in terms of learning objectives, training information, and applications.	10	L4	CO4
	Module-05			
41.	Explain the stages of an end-to-end machine learning project, from understanding the problem to fine-tuning the model.	10	L2	CO5
42.	Describe the process of obtaining, exploring, and visualizing real-world data before building a machine learning model.	10	L2	CO5
43.	Explain the major data preparation steps required before training a machine learning model, with suitable examples.	10	L2	CO5
44.	Explain the process of selecting, training, and fine-tuning a machine learning model for a given classification task.	10	L2	CO5
45.	Describe the MNIST dataset and explain how it can be used to develop a handwritten-digit classification system.	10	L2	CO5
46.	Apply a binary classification approach to a given problem and explain how the classifier assigns an instance to one of two classes.	10	L3	CO5
47.	Explain precision, recall, accuracy, and F1-score, and demonstrate how these measures are calculated from a confusion matrix.	10	L3	CO5
48.	Differentiate between binary and multiclass classification and explain the steps involved in evaluating a multiclass classifier.	10	L4	CO5
49.	Analyze classification errors and explain how error analysis can help improve the performance of a machine learning model.	10	L4	CO5
50.	Compare multi-label and multi-output classification and demonstrate their use with suitable real-world examples.	10	L3	CO5

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***Note:**

1. All modules should contain a minimum of **10** questions each and the total number of questions must be **50**.
2. Questions can carry marks of 06, 07, 08, 09, 10 and for problems: 04 or 05.
3. Follow the RBTL as per the keywords used to frame the questions.
4. Maintain the Course Outcomes (COs) as per the syllabus.
5. M: Marks, L: RBTL, C:COs.